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MARCH 1974, No. 3

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MARCH 1974, No. 3

B. J. Rothschild, Director, SOUTHWEST FISHERIES CENTER
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PREFACE

This publication, Fishing Information, appears monthly and contains 1) fishery advisory information, 2) a narrative description of pertinent surface temperature conditions, 3) a narrative description of subsurface temperature structure for parts of the North Pacific, 4) charts of winds and pressures for the eastern North Pacific, 5) charts of sea surface temperature for the North Pacific and eastern tropical Pacific, and 6) charts of subsurface temperature structure in the eastern North Pacific.

A supplement to Fishing Information appears at 15-day intervals throughout the year. This is a chart of sea surface temperature (contoured at 2°F (1°C) intervals) from Baja California to Vancouver Island out to about 135°W. Special bulletins are published in conjunction with the 15-day sea surface temperature charts which include short-term projections of albacore distribution and locations of productive fishing areas, information on oceanographic and atmospheric conditions, and other information as is appropriate during the albacore fishing season.

L. E. Eber, Leader
Fishery Information Systems
Southwest Fisheries Center
La Jolla, California

Submitted for publication - April 19, 1974

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L. Eber (Figures 4 and 6), F. Miller (Figures 9 and 10)
J. Renner (Figures 1, 2, 3, 5, 7, and 8), J.F.T. Saur (Figures 11 and 12)

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K. Raymond
CARTOGRAPHY:
R. Allen

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    National Marine Fisheries Service, La Jolla, California: Honolulu, Hawaii
    National Weather Service, San Diego, California
    National Ocean Survey, Pacific Marine Center, Seattle, Washington
Pacific Environment Institute, Fisheries Research Board of Canada, West Vancouver, British Columbia, by L.F. Giovando from observations by S.G. Westhaver at Langara Island Light; D.L. Kupillas at Cape St. James Light; J. Coldwell at Kains Island Lightstation; O.A. Edwards at Amphitrite Point Light
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Fishing vessels, Apollo, Aquarius, Balboa, Bettie M., Bold Contender, Carol S., Carol Virginia, City of San Diego, Eileen M., Elizabeth C.J., Frances Ann, Gina Karen, Independence, Jo Linda, King Oscar, Lois Seaver, Marco Polo, Maria Elena, Marietta, Mary Antonette, Mary Barbara, Mary S. Neptune, Pan Pacific, Patricia Lee, Polaris, Proud Heritage, Raefello, San Juan, Saratoga, Sea Quest, Trinidad, Venturous, Voyager.

Expendable bathythermograph observations are made by the mates of the S.S. Hawaiian Enterprise of Matson Navigation Co. The data are processed under supervision of Dr. D.R. McLain at the NMFS Pacific Environmental Group, Monterey, using computer facilities of the Fleet Numerical Weather Center. The project is partially supported by the National Science Foundation and the Office of Naval Research under Government Order NAonr-9-74.

Sea Surface Temperature and Environmental Conditions

L. EBER AND F. MILLER

Eastern North Pacific

Sea surface temperatures in the eastern north Pacific (ENP) normally change very little from February to March as minimum values are approached. Consequently almost any change exceeding a few tenths of a degree in a particular year is anomalous. This year, sea surface temperatures in the central portion of the ENP, north of Hawaii, fell more than 2°F (1.1°C), while waters out to about 300 miles off the coasts of southern California and the northern part of Baja California warmed by 1°-2°F (0.6°-1.1°C).

These changes in surface temperature conditions resulted in a spreading of negative deviations into central areas of the ENP which had previously been above normal, while in the zone adjacent to the coast, south of 35°N, negative deviations in March decreased from February values (Figure 5).

Atmospheric pressure was below normal over most of the ENP in March 1974 (Figures 1 and 2). The maximum negative departures were 8-10 millibars and occurred west of 165°W, between 35° and 45°N, and within a few hundred miles southwest of Vancouver Island.

The circulation pattern was complex and transient during the first 3 weeks of the month after which a major cyclonic system, centered at about 45°N between longitudes 170° and 180°W, spread over most of the north Pacific. Westerly winds associated with this system averaged 25-35 knots between 30° and 40°N, from 150°W-165°E during the 4th week of March, and may have contributed to the anomalous decrease of sea surface temperatures through increased evaporation and by mixing of surface water with cold subsurface water.

Western North Pacific

Sea surface temperature conditions in the western north Pacific tended to become generally cooler in March 1974, compared with the previous month, as negative deviations increased slightly and positive deviations were decreased or changed to negative. However, the major features of anomalous temperature looked much the same, with above-normal temperatures occurring in most of the region between latitudes 37° and 50°N while temperatures in the region 20°-37°N were generally below normal (Figure 6).

Eastern Tropical Pacific

Sea surface temperatures in March 1974 were characterized by gradual warming over the eastern south Pacific, east of 130°W, and in the equatorial zone east of 180°. Warming also occurred off Central America out to 100°W.

The temperature patterns in March 1974 (Figure 9) are similar to those in February 1974 and reflect normal seasonal changes. The anomaly patterns of February and March (Figure 10) are similar also. However, in the equatorial eastern Pacific (5°N-5°S) the negative anomalies have diminished significantly. This reflects reduced upwelling especially east of 130°W.

Along the coast of South America and westward to 90°W, ship weather observations are sparse, and there have been no shore station data since October, however, the few observations available indicate a return to normal of sea surface temperatures in the Peru Current and adjacent areas. This apparent trend is supported by surface winds, pressures and clouds which also have been near normal for the past 2 months.

The appearance of below-normal temperatures between 5° and 15°N, centered along 110°W, was associated with persistent southeast trades of about 15 knots. This may have caused mixing of surface water with cooler water below. A similar process may have contributed to cooler anomalies west of 140°W, as a result of steady northeast trades of 15-20 knots. Temperatures have returned to near normal south and west of Baja California in association with decreasing cloud cover and surface winds which were 2-4 knots weaker than normal.

Subsurface Temperature Structure in the Northeast Pacific Ocean

J.F.T. Saur

Observations for the sections of subsurface temperature presented in this issue, Figures 11 and 12, were made on Voyage 85 of the container vessel, S.S. Hawaiian Enterprise. Such data are processed after cooperating ships return to San Francisco. Starting with this issue the subsurface temperature observations which are given here will generally be taken prior to mid-month or in the latter part of the previous month. The San Francisco-Honolulu section, Figure 11, was made in the first week of March, 1974, which is one week after the last published section. The Honolulu-Los Angeles section, Figure 12, was made in the second week in March, one month since the last section on that route.

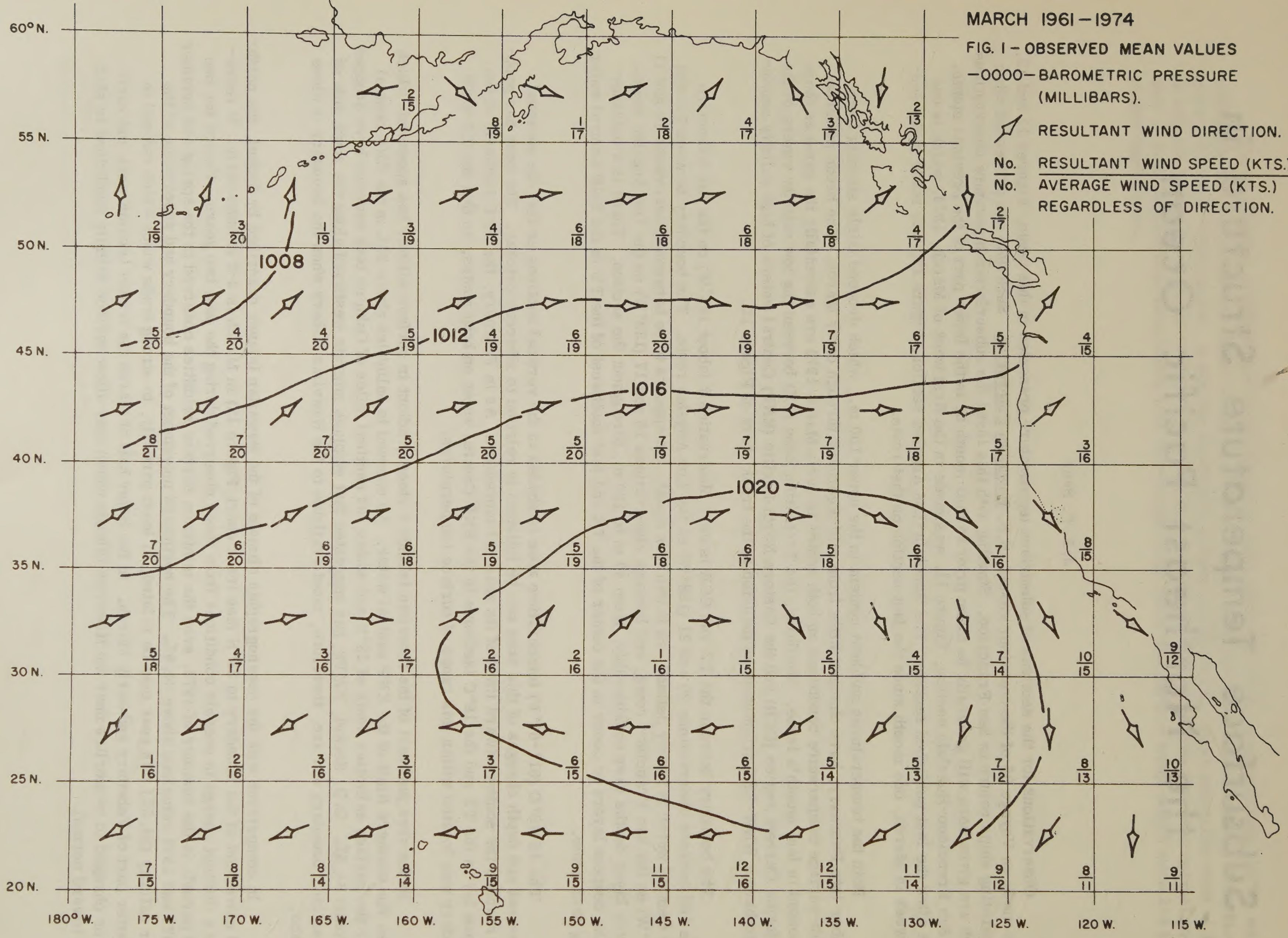
Both the temperatures and heat content in the upper 100 m., which dropped fairly steadily from October into February, have changed little from mid-February through early March. The broad patterns of sub-surface temperature conditions on both routes in early March 1974 are essentially the same as those presented in last month's issue. Similarly, the Transition Zone (TZ) between the low salinity waters of the California Current region (CCR) and the Eastern North Pacific (ENP) Central waters of high salinity continues to have a WNW-ESE orientation as depicted in the track chart of Figure 12.

The boundary between the TZ and CCR is near observation 7 (about 133°W) on the San Francisco route and between observations 20 and 21 (126°W) on the Los Angeles route. The boundary between TZ and ENP Central water is poorly defined, as it was last month, but appears to be between observations 10 and 11 (138°W) on the San Francisco route, and between observations 16 and 17 (133°W) on the Los Angeles route. Surface layer depths vary considerably, from 40 m to 120 m, throughout the section. There is a tendency for the deepest layers to occur in the center of the TZ and just southwest of the TZ in the ENP Central water along each route.

The 16-19°C (61°-66°F) temperature zone is shaded in the vertical sections so that the seasonal movement and depth changes of this zone can be followed in relation to albacore catches. The zone has probably reached the southwestward limit of its seasonal movement. As in February, the 16°C isotherm at the surface lay in the TZ and the 19°C isotherm in the ENP Central water on both routes, so that the TZ-ENP boundary was located within this range of surface temperatures.

In the area just east of the Hawaiian Islands a steep gradient in surface salinity has appeared, which marks the southern limit of the ENP central water. As opposed to salinities above 35‰ in the ENP central water the surface salinities south of 23°N and within 200 nautical miles of Oahu on both sections have dropped to around 34.5‰. G.R. Seckel, NMFS, has suggested that skipjack migrate westward along the south side of this salinity boundary and are, therefore, most available to the Hawaiian fishery when the boundary is close to Oahu.

In comparison with the oceanographic climate of the Hawaiian Islands described by Seckel, the northward movement of the boundary to 23°N (see track chart, Figure 12) in March is 2-3 months early. It represents a distinct change in oceanic conditions from those observed during the past two years. Except for two brief periods in the summer of 1972, even the minimum surface salinities observed in the spring and summer of 1972 and 1973 remained above 34.8‰. The northward movement of the boundary and appearance of the lower salinity (34.5‰) this year may be related, at least partially, to strong trade winds which existed in the latter part of February and early March. In the latter half of March the trades became weak and variable or changed to westerlies near the Hawaiian Islands which may allow surface salinity conditions to shift back toward normal.


-0000- BAROMETRIC PRESSURE (MILLIBARS).
RESULTANT WIND DIRECTION.
No. / No.
RESULTANT WIND SPEED (KTS.).
AVERAGE WIND SPEED (KTS.) REGARDLESS OF DIRECTION.
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
1008
1012
1016
1020
2/15
8/19
1/17
2/18
4/17
3/17
2/13
2/19
3/20
1/19
3/19
4/19
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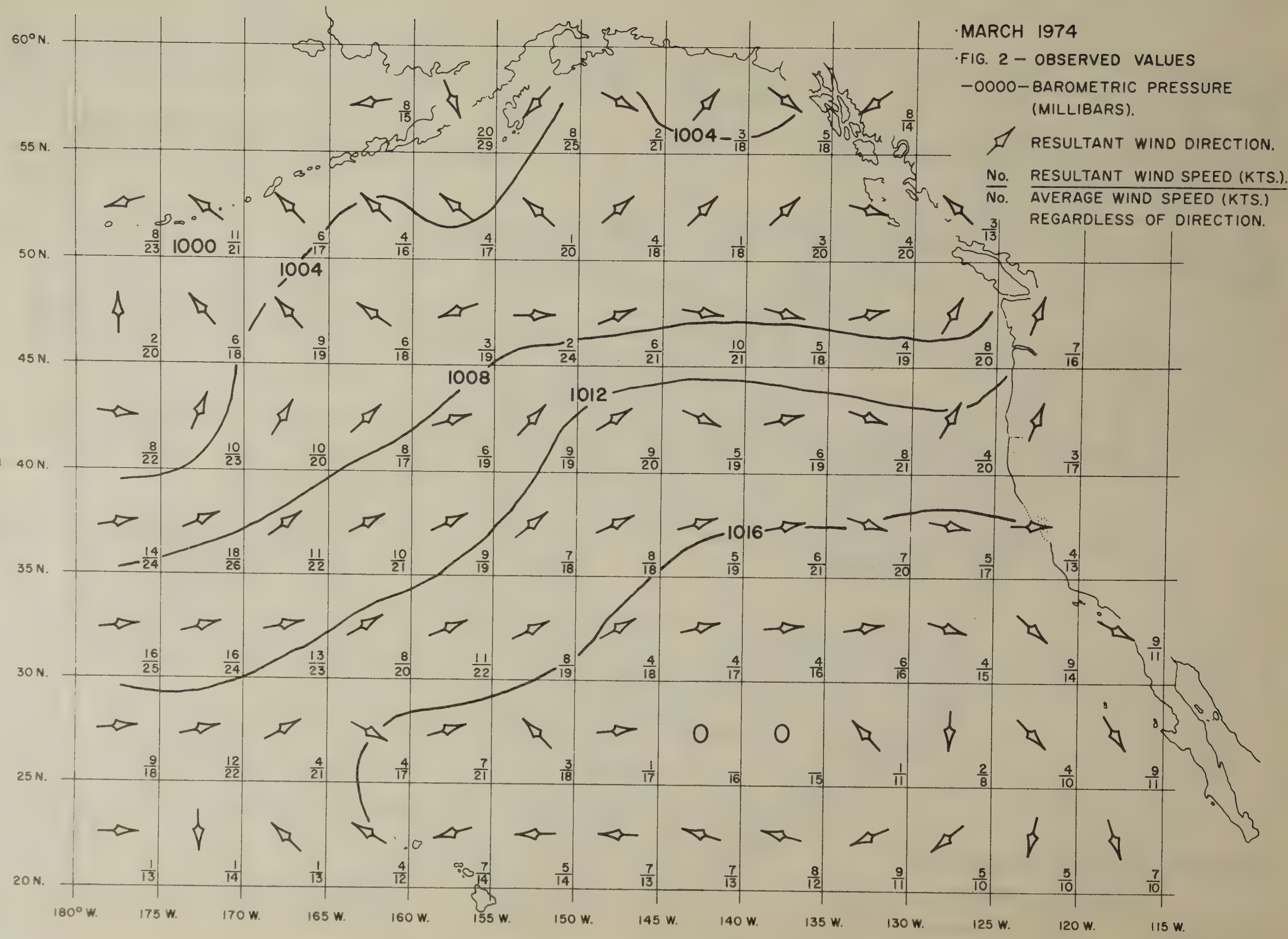
9/15
9/15
11/15
12/16
12/15
11/14
9/12
8/11
9/11

MARCH 1961–1974

FIG. 1 – OBSERVED MEAN VALUES

MARCH 1974

FIG. 2 — OBSERVED VALUES



—0000— BAROMETRIC PRESSURE (MILLIBARS).
RESULTANT WIND DIRECTION.
No./No. RESULTANT WIND SPEED (KTS.) / AVERAGE WIND SPEED (KTS.) REGARDLESS OF DIRECTION.
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
1000
1004
1004
1008
1012
1016
8/15
20/29
8/25
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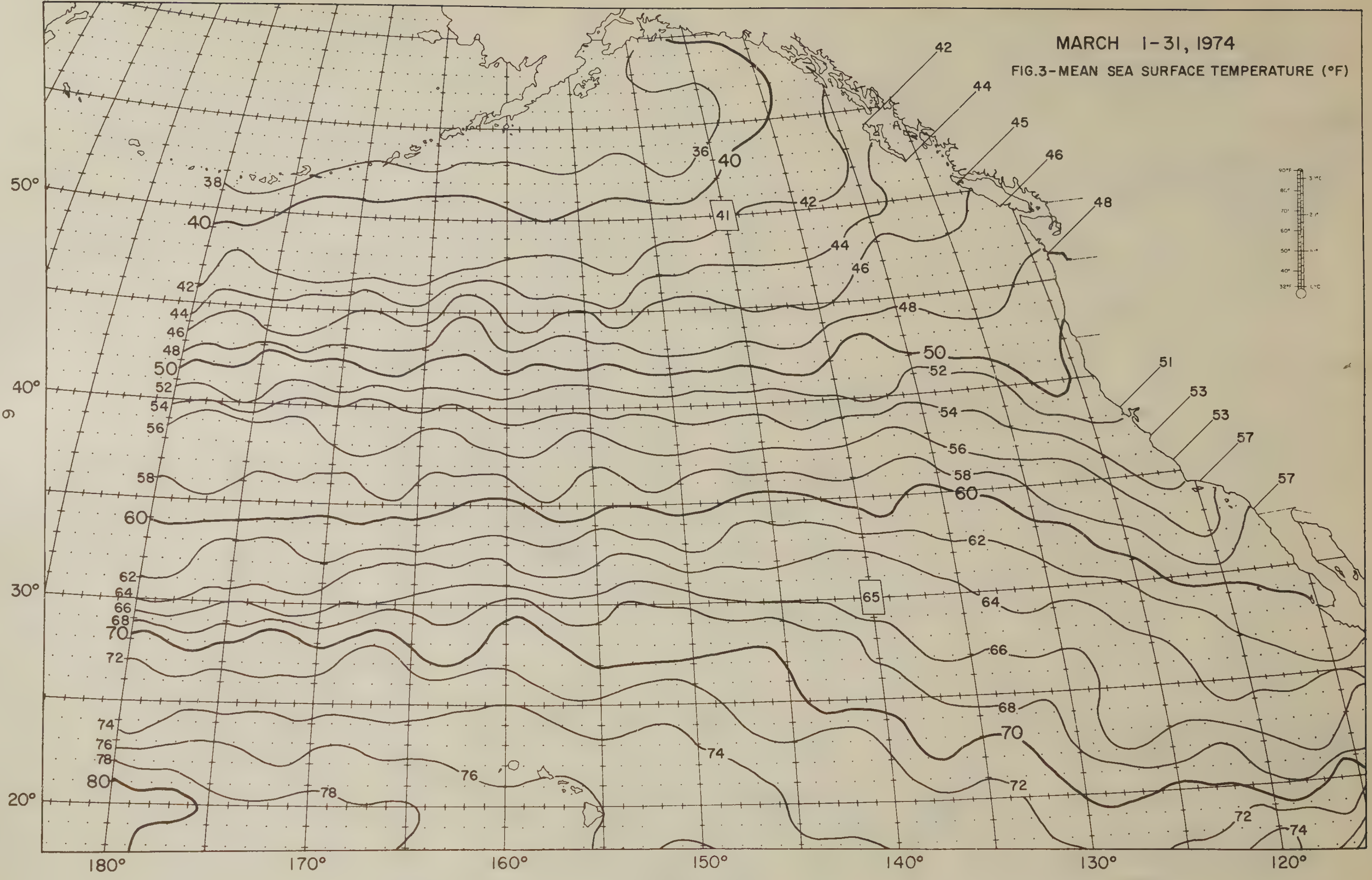

MARCH 1-31, 1974

FIG.3-MEAN SEA SURFACE TEMPERATURE (°F)

50°
40°
30°
20°
180°
170°
160°
150°
140°
130°
120°
36
38
40
41
42
44
45
46
48
50
51
52
53
54
56
57
58
60
62
64
65
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72
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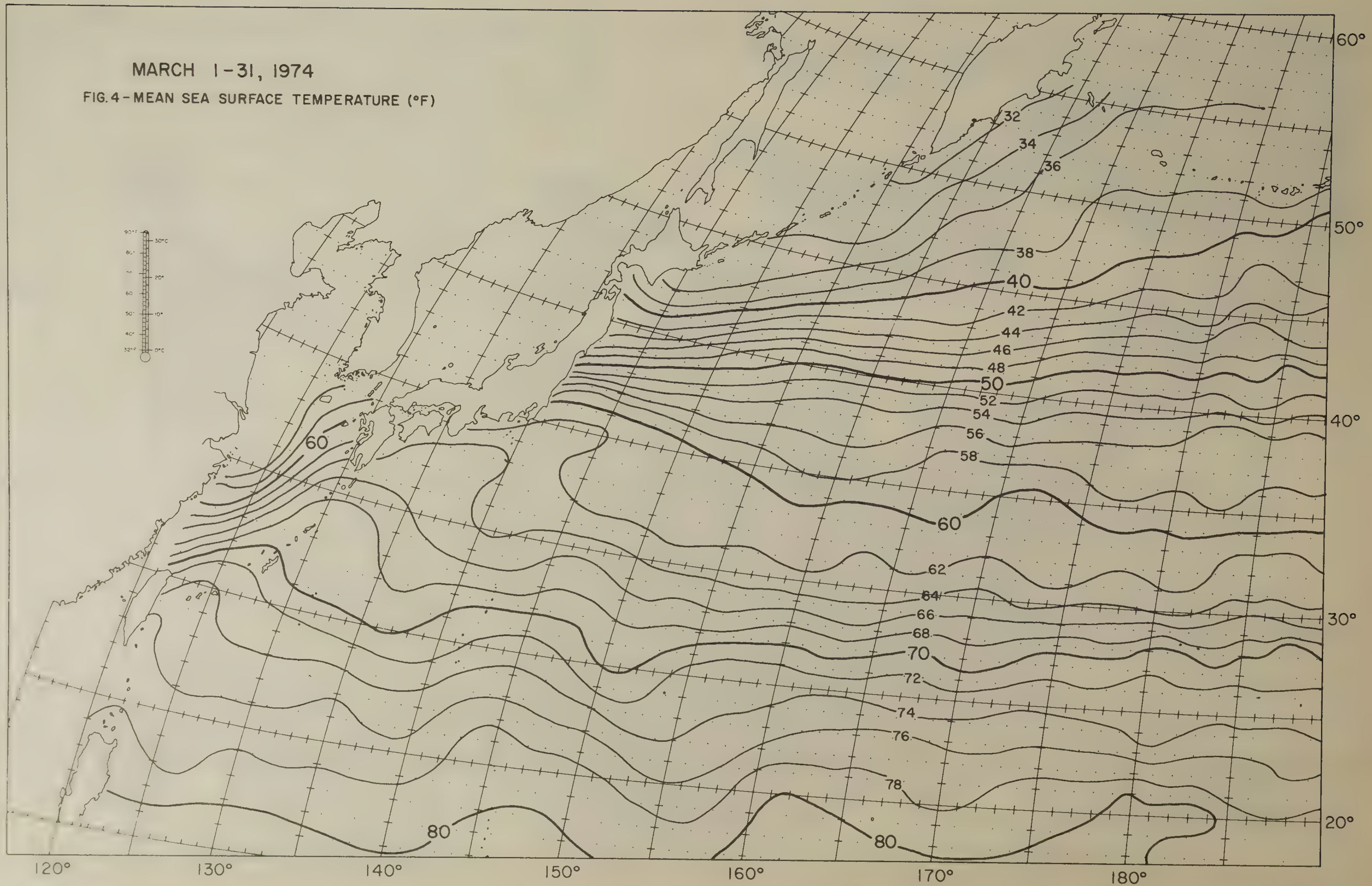
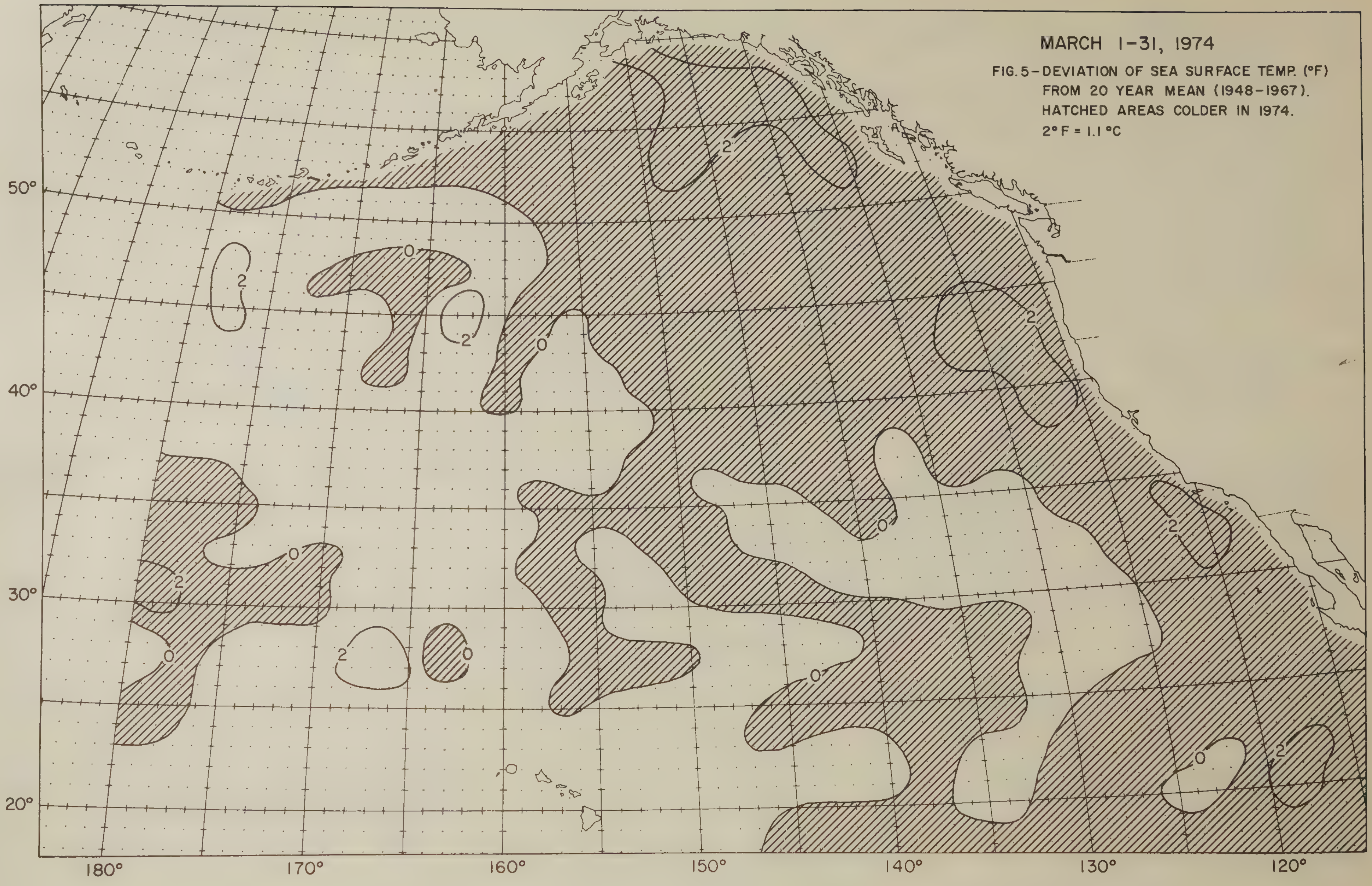
76
78
80
90°F
80°
70°
60°
50°
40°
32°F



MARCH 1-31, 1974

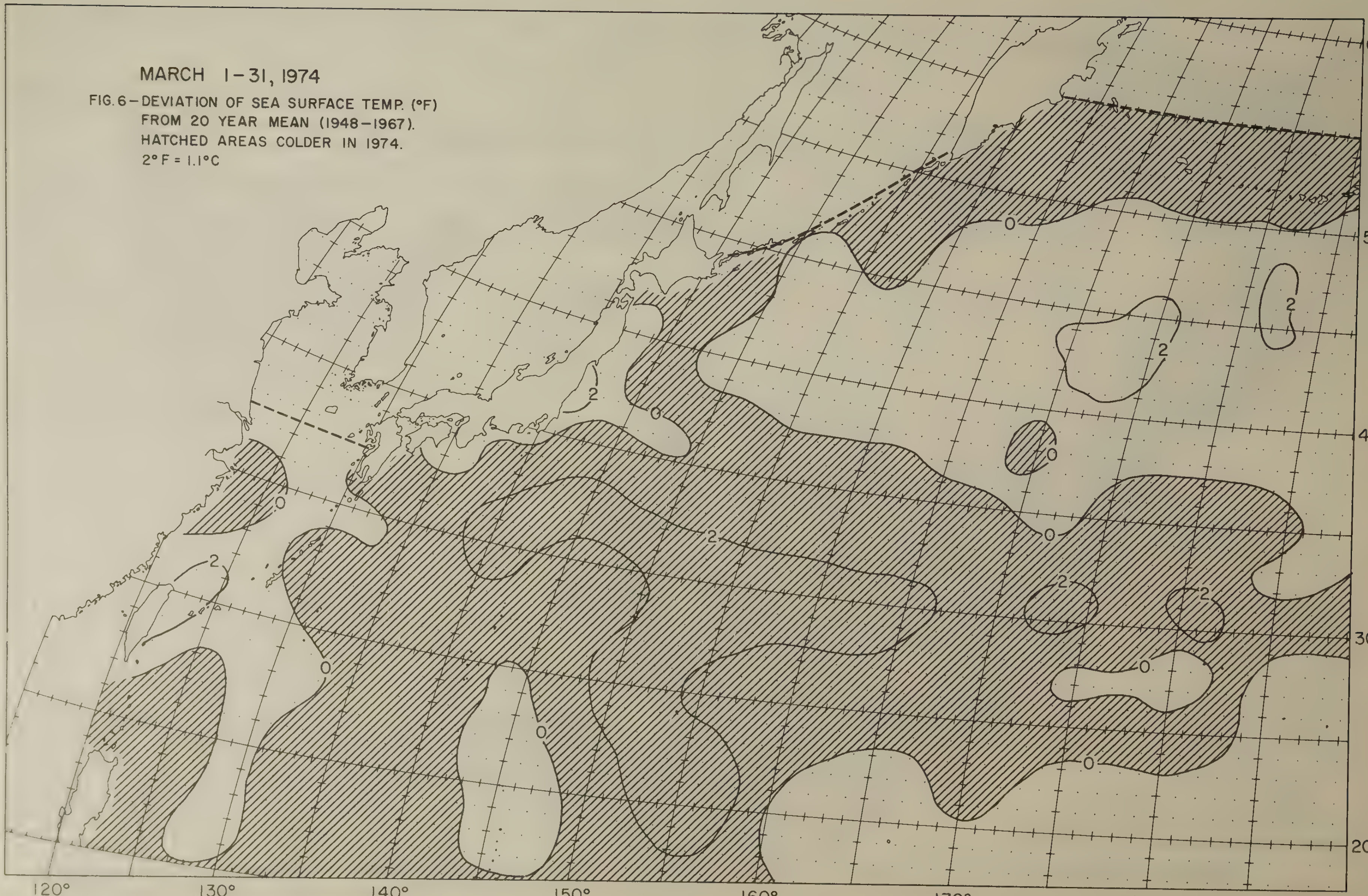
FIG. 4 - MEAN SEA SURFACE TEMPERATURE (°F)

32
34
36
38
40
42
44
46
48
50
52
54
56
58
60
60
62
64
66
68
70
72
74
76
78
80
80
60°
50°
40°
30°
20°
120°
130°
140°
150°
160°
170°
180°


50°
40°
30°
20°
180°
170°
160°
150°
140°
130°
120°
0
2

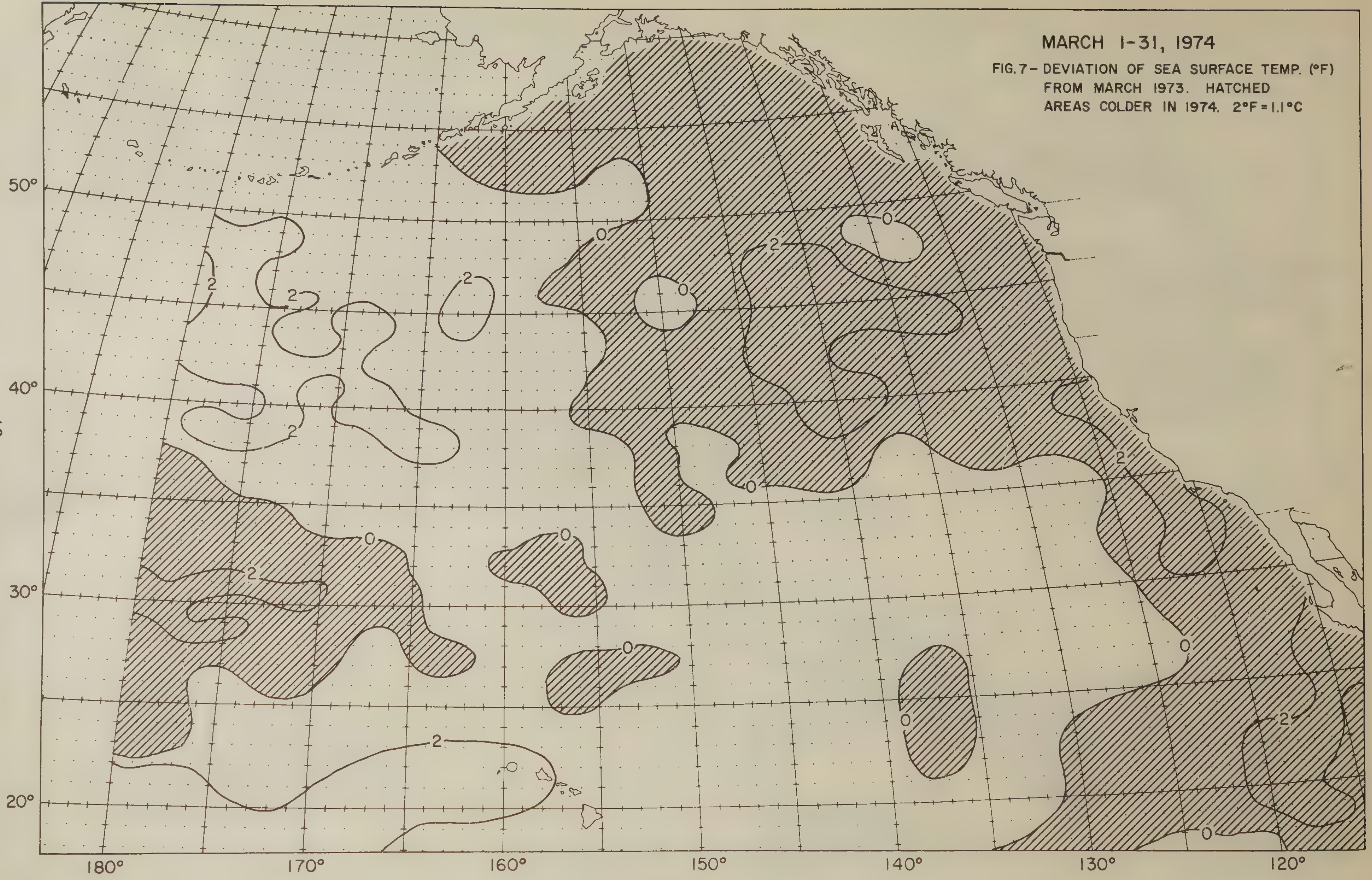
MARCH 1-31, 1974

FIG. 5-DEVIATION OF SEA SURFACE TEMP. (°F)
FROM 20 YEAR MEAN (1948-1967).
HATCHED AREAS COLDER IN 1974.
2° F = 1.1 °C


60°
50°
40°
30°
20°
120°
130°
140°
150°
160°
170°
180°
0
2

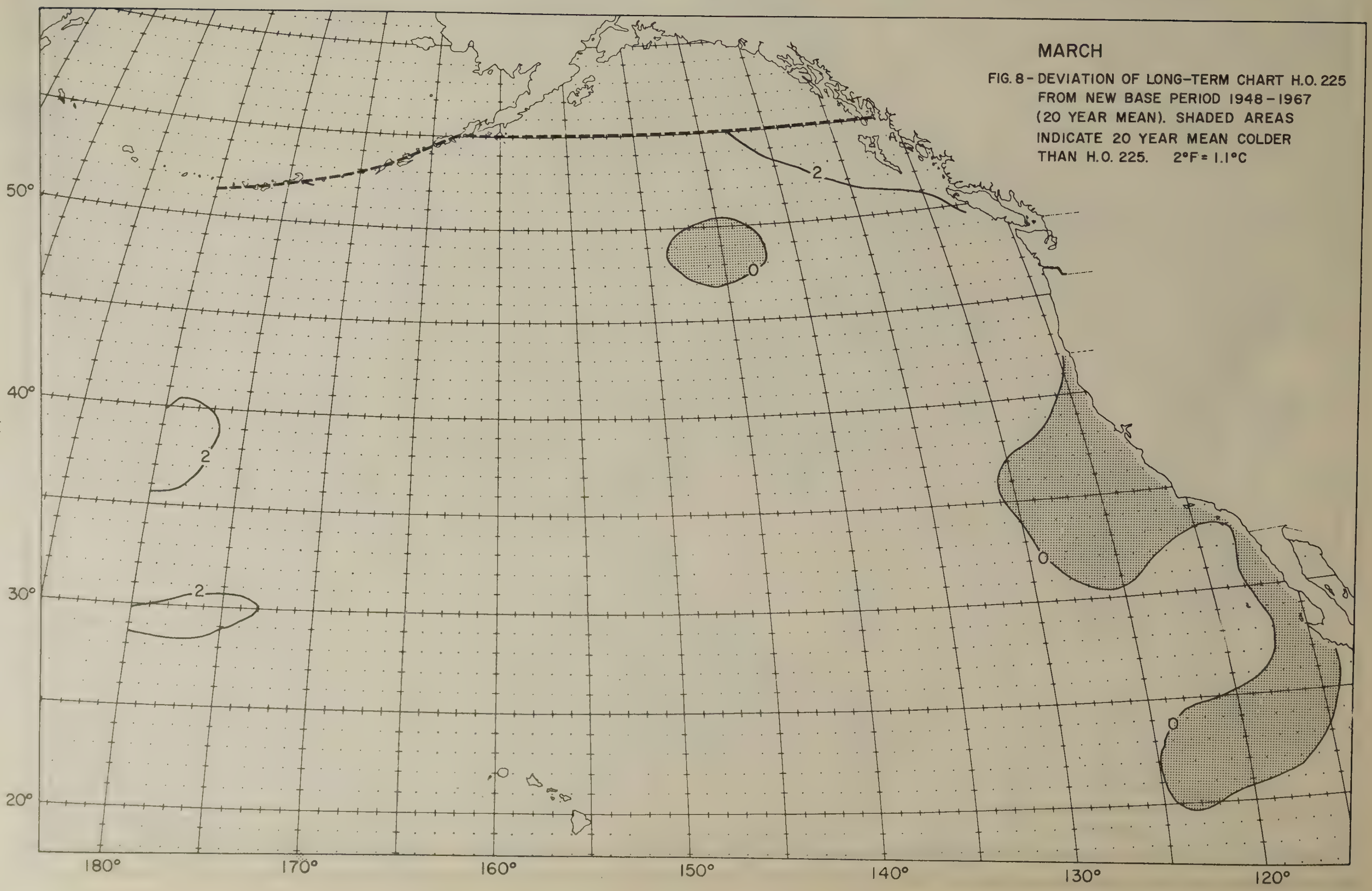
MARCH 1–31, 1974

FIG. 6 – DEVIATION OF SEA SURFACE TEMP. (°F) FROM 20 YEAR MEAN (1948–1967). HATCHED AREAS COLDER IN 1974. 2° F = 1.1°C


0
2
50°
40°
30°
20°
180°
170°
160°
150°
140°
130°
120°

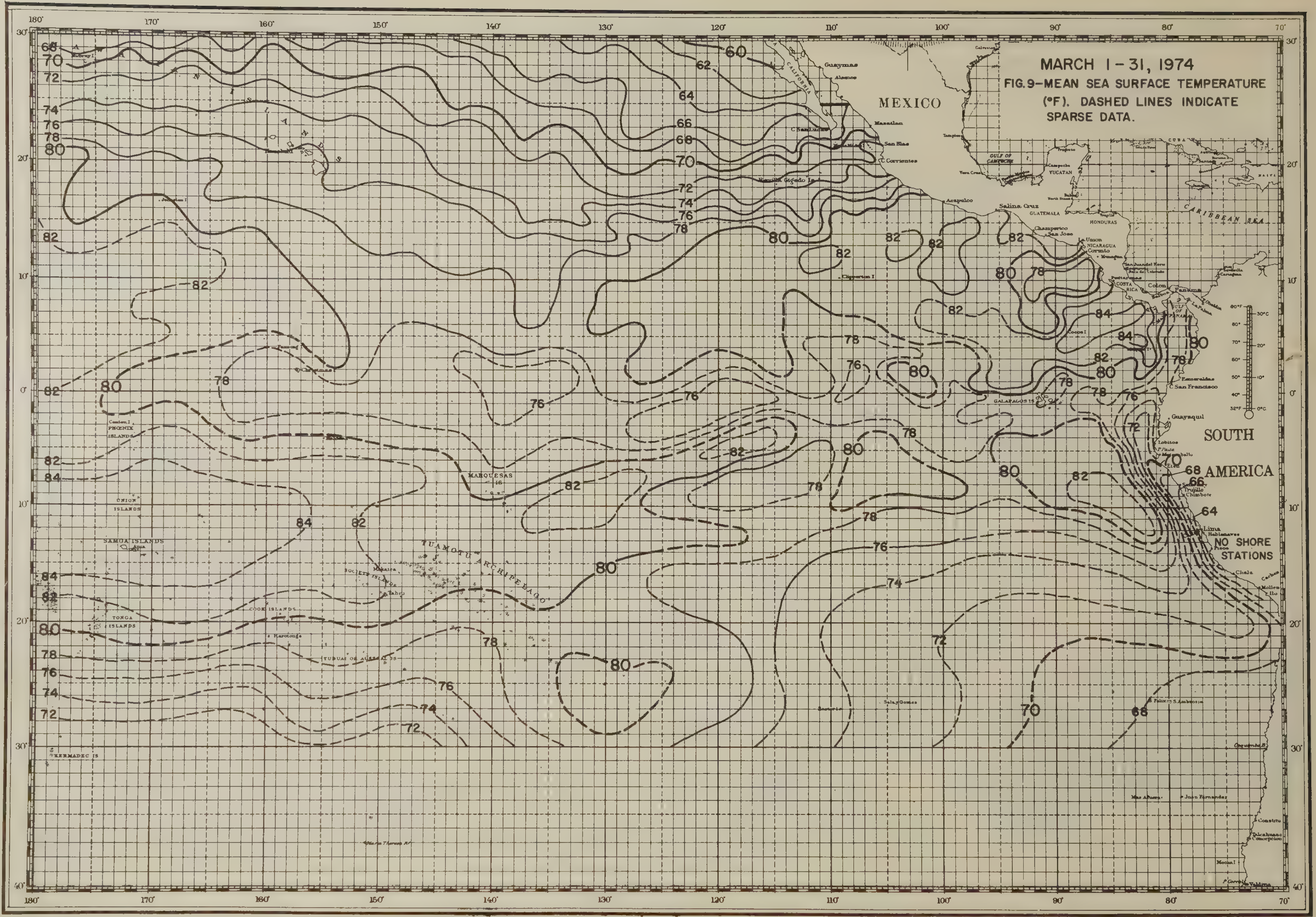
MARCH 1-31, 1974

FIG. 7 - DEVIATION OF SEA SURFACE TEMP. (°F) FROM MARCH 1973. HATCHED AREAS COLDER IN 1974. 2°F = 1.1°C


2
0
2
2
0
0
50°
40°
30°
20°
180°
170°
160°
150°
140°
130°
120°

MARCH

FIG. 8 - DEVIATION OF LONG-TERM CHART H.O. 225 FROM NEW BASE PERIOD 1948 - 1967 (20 YEAR MEAN). SHADED AREAS INDICATE 20 YEAR MEAN COLDER THAN H.O. 225. 2°F = 1.1°C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SOUTH AMERICA
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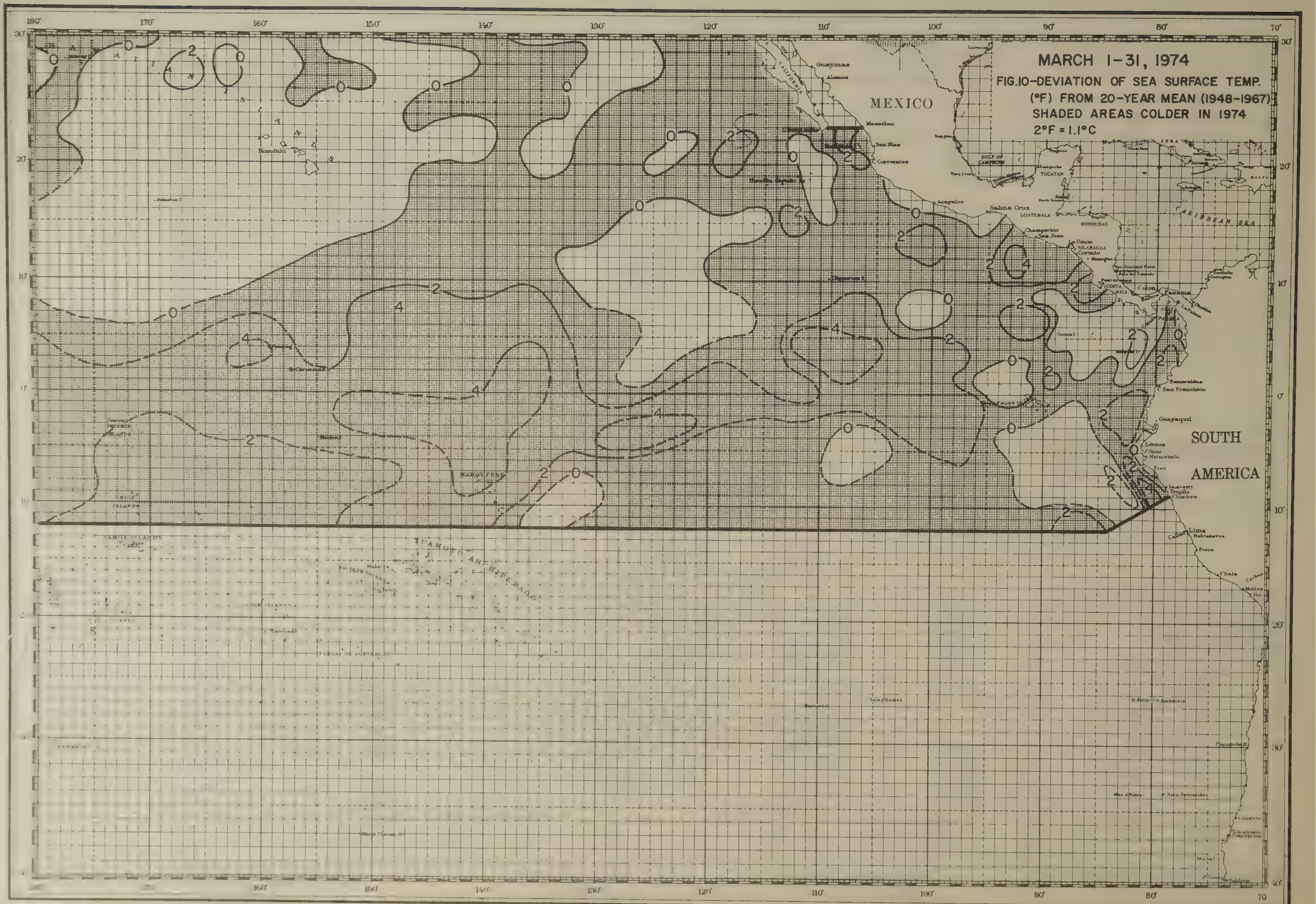
GULF OF CALIFORNIA
GULF OF CAMPECHE
YUCATAN
GUATEMALA
HONDURAS
NICARAGUA
COSTA RICA
Panama
Guaymas
Mazatlan
San Blas
C. Corrientes
Acapulco
Salina Cruz
Clipperton I.
GALAPAGOS IS.
Guayaquil
Lima
NO SHORE STATIONS
MARQUESAS
TUAMOTU ARCHIPELAGO
SOCIETY ISLANDS
COOK ISLANDS
TUBUAI OR AUSTRAL IS.
SAMOA ISLANDS
TONGA ISLANDS
UNION ISLANDS
PHOENIX ISLANDS
KERMADEC IS.
Juan Fernandez
Mas Afuera
Sala y Gomez
Easter I.
80°F
30°C
32°F
0°C
60
62
64
66
68
70
72
74
76
78
80
82
84
180°
170°
160°
150°
140°
130°
120°
110°
100°
90°
80°
70°
30°
20°
10°
0°
10°
20°
30°
40°

MARCH 1 - 31, 1974

FIG. 9—MEAN SEA SURFACE TEMPERATURE (°F). DASHED LINES INDICATE SPARSE DATA.



MEXICO
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HONDURAS
NICARAGUA
COSTA RICA
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Panama
San Francisco
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Salaverry
Trujillo
Chimbote
Lima
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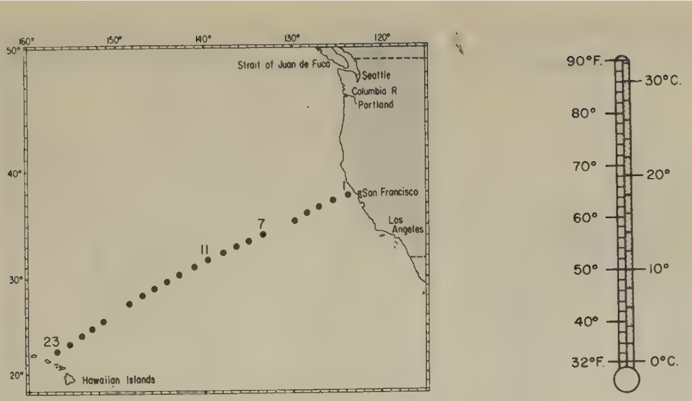
Pisco
Chala
YUCATAN
GULF OF CAMPECHE
CUBA
Honolulu
Johnston I.
SAMOA ISLANDS
COOK ISLANDS
TUAMOTU ARCHIPELAGO
TUBUAI OR AUSTRAL IS
MARQUESAS
GALAPAGOS IS
Cocos I.
San Felix
Sala y Gomez
Juan Fernandez
Valdivia
180°
170°
160°
150°
140°
130°
120°
110°
100°
90°
80°
70°
30°
20°
10°
0°
0
2
4

MARCH 1-31, 1974

FIG.10-DEVIATION OF SEA SURFACE TEMP. (°F) FROM 20-YEAR MEAN (1948-1967) SHADED AREAS COLDER IN 1974 2°F = 1.1°C

FIGURE 11



160°
150°
140°
130°
120°
50°
40°
30°
20°
Strait of Juan de Fuca
Seattle
Columbia R.
Portland
San Francisco
Los Angeles
1
7
11
23
Hawaiian Islands
90°F.
80°
70°
60°
50°
40°
32°F.
30°C.
20°
10°
0°C.

HONOLULU – SAN FRANCISCO

MARCH 2–6, 1974

SS HAWAIIAN ENTERPRISE

VOYAGE 85

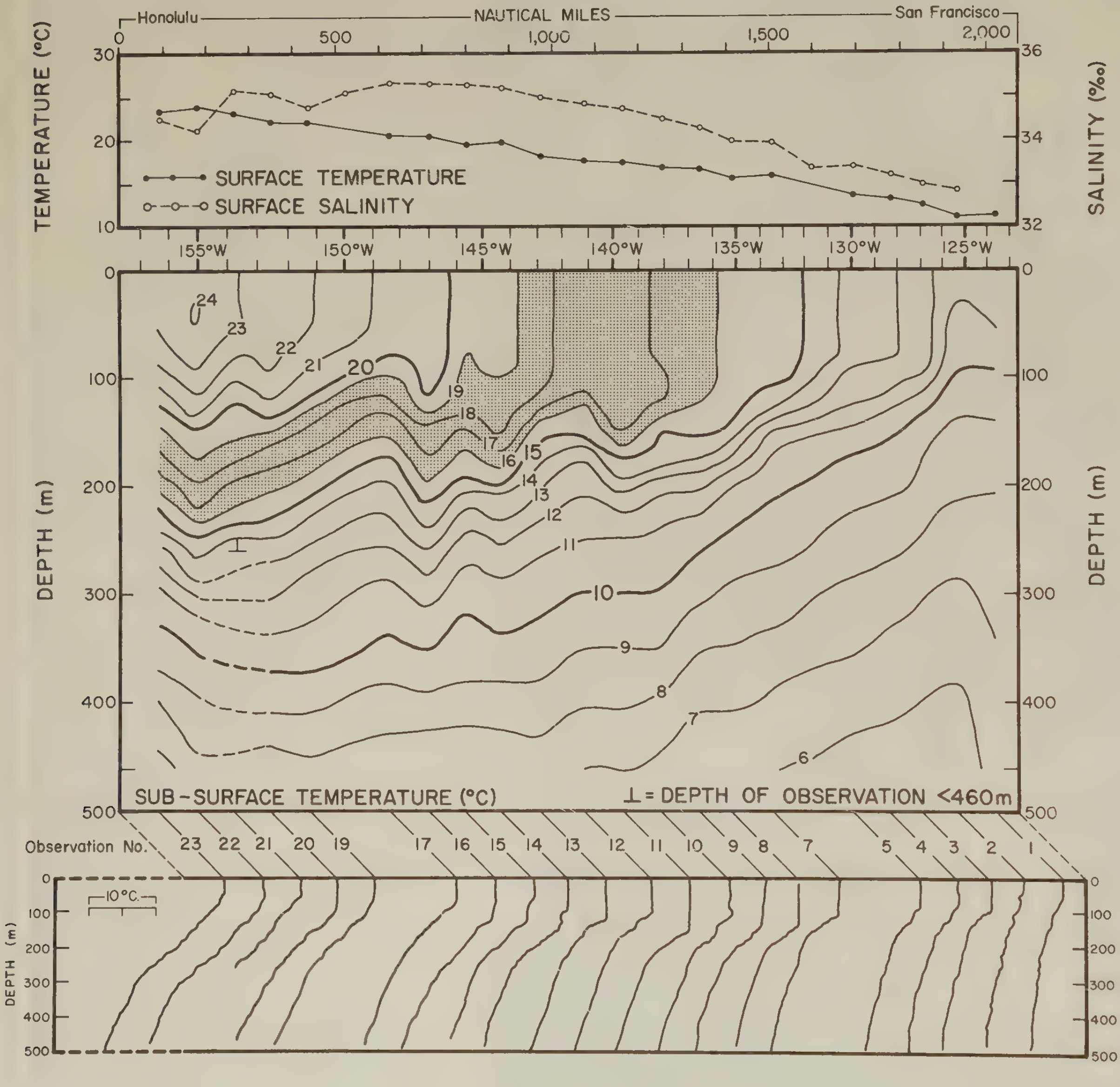
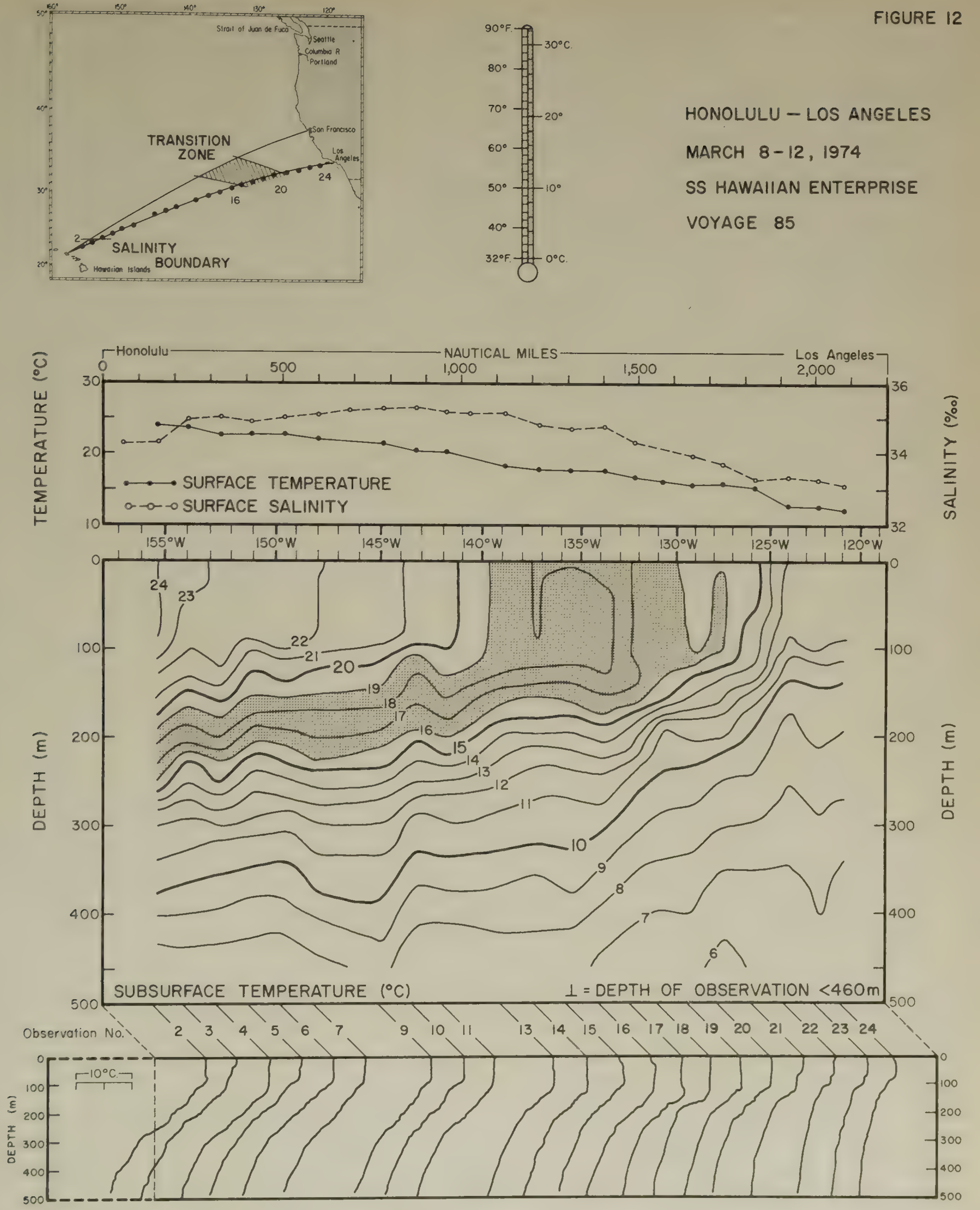


FIGURE 12



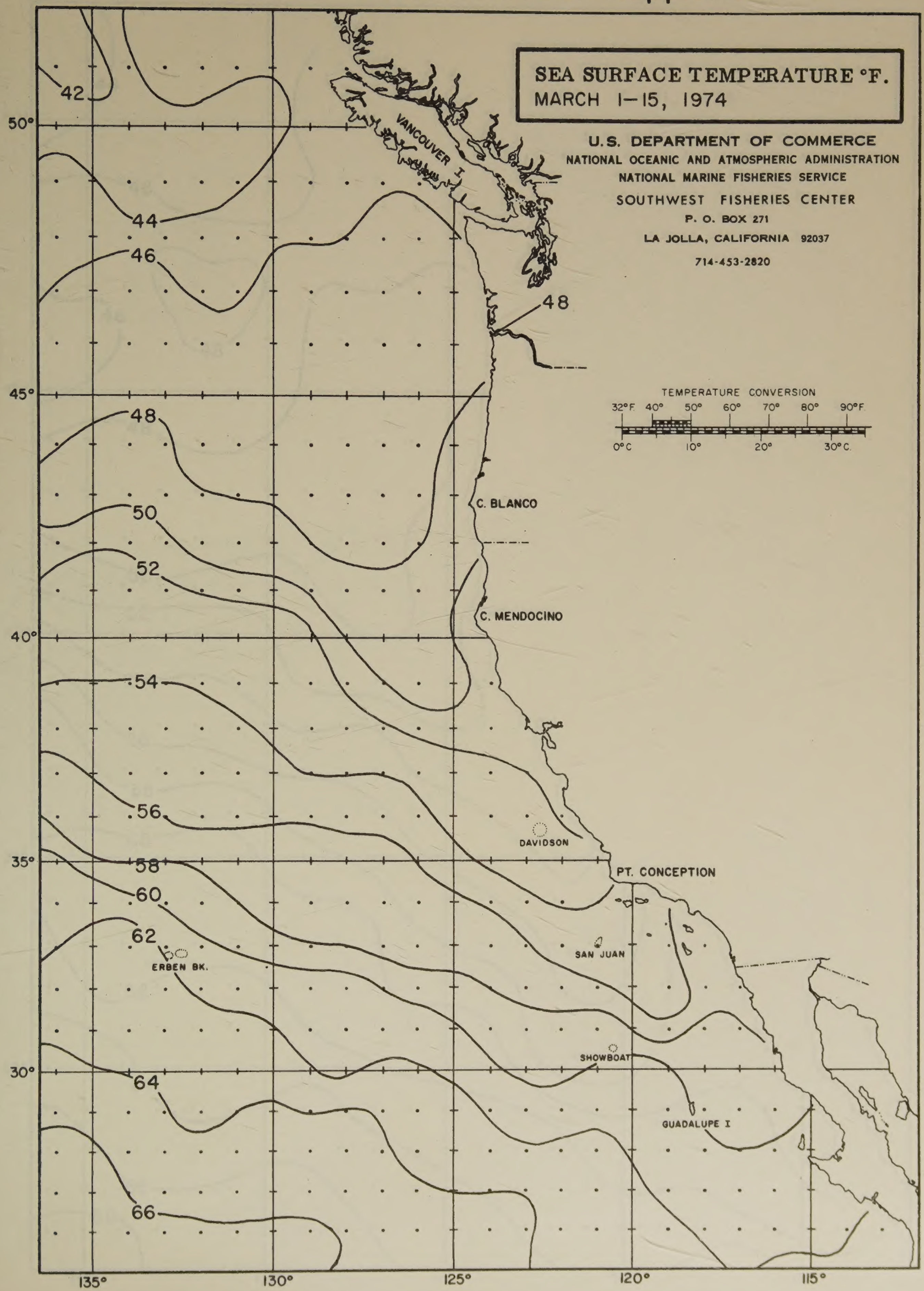
HONOLULU — LOS ANGELES

MARCH 8-12, 1974

SS HAWAIIAN ENTERPRISE

VOYAGE 85

FISHING INFORMATION - supplement



SEA SURFACE TEMPERATURE °F.
MARCH 1-15, 1974

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL MARINE FISHERIES SERVICE
SOUTHWEST FISHERIES CENTER
P. O. BOX 271
LA JOLLA, CALIFORNIA 92037
714-453-2820

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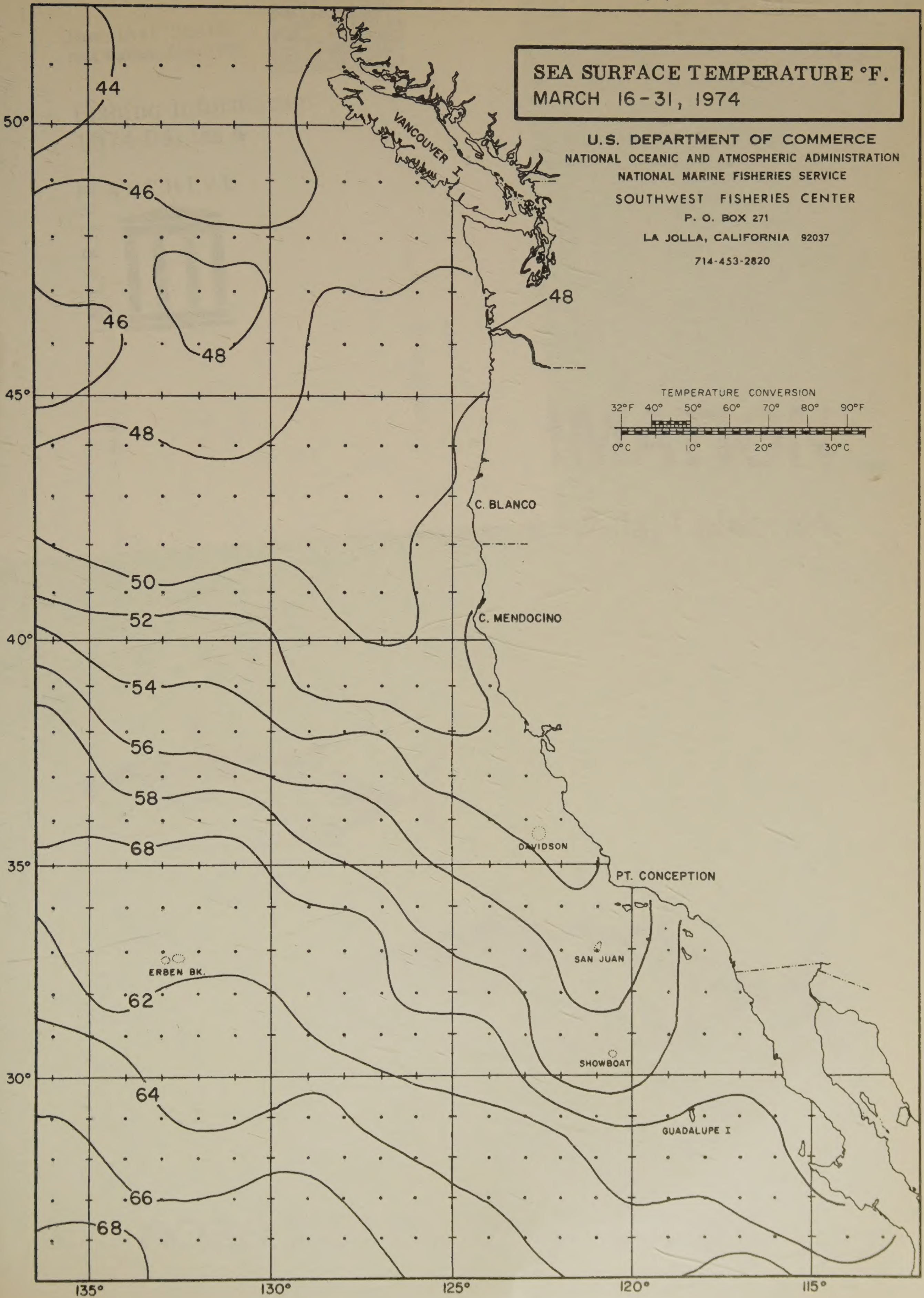
VANCOUVER I.
C. BLANCO
C. MENDOCINO
DAVIDSON
PT. CONCEPTION
SAN JUAN
ERBEN BK.
SHOWBOAT
GUADALUPE I
TEMPERATURE CONVERSION
32°F 40° 50° 60° 70° 80° 90°F
0°C 10° 20° 30°C.
50°
45°
40°
35°
30°
135°
130°
125°
120°
115°

FISHING INFORMATION - supplement



SEA SURFACE TEMPERATURE °F.
MARCH 16-31, 1974

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL MARINE FISHERIES SERVICE
SOUTHWEST FISHERIES CENTER
P. O. BOX 271
LA JOLLA, CALIFORNIA 92037
714-453-2820

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50°
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